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FAA APPROVED

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT GARMIN G1000 INTEGRATED AVIONICS SYSTEM WITH GFC 700 AUTOMATIC FLIGHT CONTROL SYSTEM

DIAMOND MODEL DA 40
DIAMOND MODEL DA 40 F

Reg. No. _____ S/N _____

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the Garmin G1000 Integrated Avionics System and GFC 700 automatic flight control system are installed in accordance with STC SA01444WI-D. The information contained herein supplements the information of the basic Airplane Flight Manual. For Limitations, Procedures and Performance information not contained in this Supplement consult the basic Airplane Flight Manual.

Note: This Airplane Flight Manual Supplement follows the format and content of the Airplane Flight Manual for the Diamond DA 40 for consistency and ease of use.

Note: This Airplane Flight Manual Supplement supersedes all previously approved G1000/GFC700 Airplane Flight Manual Supplements for DA 40 and DA 40 F, including those required by STC SA01254WI-D and STC SA01389WI.

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Date: 5/16/2013

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LOG OF REVISIONS

Revision Number	Page Number(s)	Description	FAA Approved	Date of Approval
1	All	Initial Release	Robert Murray	7/26/2007
2	All	Add Software Levels	Robert Murray	9/6/2007
3	All	Add Software Levels	Robert Murray	2/28/2008
4	All	Add Software Levels	Robert Murray	4/4/2008
5	All	Update Software Levels for non-WAAS	Robert Murray	4/18/2008
6	All	Add Software Levels	Robert Murray	9/11/2009
7	All	Revised by Garmin ODA. Correct minor typographical errors and administrative corrections to fuel quantity indication range markings.	Robert Murray	9/21/2010
8	All	Incorporate revisions for system software level 0321.23.	See Page 1	See Page 1

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DIAMOND MODEL DA 40
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SECTION 1
GENERAL

G1000

The G1000 Integrated Avionics System is a fully integrated flight, engine, communication, navigation and surveillance instrumentation system. The system consists of a Primary Flight Display (PFD), Multi-Function Display (MFD), audio panel, Air Data Computer (ADC), Attitude and Heading Reference System (AHRS), engine sensors and processing unit (GEA), and dual integrated avionics units (GIA) each containing VHF communications, VHF navigation, and GPS (Global Positioning System).

GIA 63 units are standard and provide non-WAAS GPS position information in accordance with TSO-C129a class A1. Optional GIA 63W units provide WAAS augmented GPS position in accordance with TSO C145a, Class 3.

The primary function of the PFD is to provide attitude, heading, air data, navigation, and alerting information to the pilot. The PFD may also be used for flight planning. The primary function of the MFD is to provide engine information, mapping, terrain information, and flight planning. The audio panel is used for selection of radios for transmitting and listening, intercom functions, and marker beacon functions.

The primary function of the VHF Communication portion of the G1000 is to enable external radio communication. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites (and WAAS satellites if so equipped), recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

If the optional TAWS function is installed in the G1000, the pilot will receive appropriate aural warnings and cautions for terrain and obstacles. The pilot should refer to the DA 40/DA 40F Pilot’s Guide for the terrain warning and caution messages and system information.

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Operational Approvals

G1000 GPS NAVIGATION SYSTEM, GIA 63 INSTALLED

GIA 63 units are standard and provide position information in accordance with TSO-C129a class A1. The Garmin G1000 system has been demonstrated capable of, and has been shown to meet the accuracy requirements for the following operations provided it is receiving usable navigation data:

- The G1000 Integrated Avionics system as installed in this aircraft complies with AC 20-138A for navigation within the U.S. National Airspace System using GPS for IFR en-route, terminal area, and non-precision approach operations (including those approaches titled “GPS”, “or GPS”, and “RNAV (GPS)” approaches).

- The G1000 Integrated Avionics system as installed in this aircraft has been found to comply with the requirements for GPS as a Primary Means of Navigation for oceanic and remote navigation – RNP-10, per FAA AC 20-138A and FAA Order 8400-12A. Both GPS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.

- North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace per AC 91-49 and AC 120-33. Both GPS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.

NOTE

Each GIA 63 computes an independent navigation solution based on its GPS sensor. The G1000 will use the GPS sensor with the highest signal quality and will automatically revert to the other sensor if the active sensor fails or if the secondary sensor is determined to be more accurate. An “AHRS 1 GPS – “ message means that one of the GPS receivers has failed. Refer to the MFD AUX-GPS STATUS page to determine the state of the GPS receivers.

- Enroute and Terminal including RNP5/BRNAV and PRNAV (RNP-1) - In accordance with JAA TGL-10 Rev 1, ACJ 20X4, AC 90-96A, and AC 90-100A provided the FMS is receiving usable navigation information from one or more GPS/SBAS receivers.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for B-RNAV in accordance with AMJ20X2.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for PRNAV in accordance with PRNAV requirements: JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10: Airworthiness and Operational Approval for Precession RNAV Operations in Designated European Airspace 7.1 Required Functions.

- Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

G1000 GPS/SBAS NAVIGATION SYSTEM, GIA 63W INSTALLED

The Garmin G1000 GPS/SBAS receivers, GIA 63W, incorporating SW version 3.0 or later approved version and GA35 (PN 013-00235-00) antennas are approved under TSO-C145a/TSO-C146a equipment Class 3 and installed in accordance with AC 20-138A. The Garmin G1000 system has been demonstrated capable of, and has been shown to meet the accuracy requirements for the following operations provided it is receiving usable navigation data:

- The G1000 Integrated Avionics system as installed in this aircraft complies with AC 20-138A for navigation using GPS and WAAS (within the coverage of a Space-Based Augmentation System complying with ICAO Annex 10) for IFR en route, terminal area, and non-precision approach operations (including those approaches titled “GPS”, “or GPS”, and “RNAV (GPS)” approaches). The G1000 Integrated Avionics system installed in this aircraft is approved for approach procedures with vertical guidance including “LPV”, “LNAV/VNAV”, and “LNAV + V” within the U.S. National Airspace System.

- The G1000 Integrated Avionics system as installed in this aircraft has been found to comply with the requirements for GPS as a Primary Means of Navigation for oceanic and remote navigation – RNP-10, (per FAA AC 20-138A and FAA Order 8400-12A), when used in conjunction with Garmin WAAS Fault Detection/Exclusion (WFDE) Prediction Program, part number 006-A0154-01 or later approved version with GA35 (PN 013-00235-00) antennas selected. Both GPS/SBAS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation (LRN) sensor. This does not constitute an operational approval.

- The G1000 WFDE predication program works in combination with the Garmin AT, Inc. Route Planning Software, version 1.2, or later approved version. The route planning and WFDE prediction program can be downloaded from Garmin G1000 website on the Internet. For information on using the WFDE Prediction Program, refer to Garmin WAAS FDE Prediction Program, part number 190-00643-01, 'WFDE Prediction Program Instructions'.

- North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace per AC 91-49 and AC 120-33. Both GPS/SBAS receivers are required to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. This does not constitute operational approval.

NOTE

Each GIA 63W computes an independent navigation solution based on its GPS sensor. The G1000 will use the GPS sensor with the highest signal quality and will automatically revert to the other sensor if the active sensor fails or if the secondary sensor is determined to be more accurate. An "AHRS 1 GPS – " message displayed in the ALERTS window means that one of the GPS receivers has failed. Refer to the MFD AUX-GPS STATUS page to determine the state of the GPS receivers.

- Enroute and Terminal including RNP5/BRNAV and PRNAV (RNP-1) - In accordance with JAA TGL-10 Rev 1, ACJ 20X4, AC 90-96A, and AC 90-100A provided the FMS is receiving usable navigation information from one or more GPS/SBAS receivers.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for B-RNAV in accordance with AMJ20X2.

- The G1000 Integrated Avionics system as installed in this aircraft is eligible for PRNAV in accordance with PRNAV requirements: JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10: Airworthiness and Operational Approval for Precession RNAV Operations in Designated European Airspace 7.1 Required Functions.

- Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

ELECTRONIC FLIGHT BAG

The G1000 Integrated Avionics System as installed in this aircraft has been approved as a Hardware Class 3, Software Type B Electronic Flight Bag (EFB) in accordance with AC 120-76B when using current FliteChart or ChartView data. Additional operational approvals may be required.

For operations under part 91, it is suggested that a secondary or back up source of aeronautical information necessary for the flight be available to the pilot in the aircraft. The secondary or backup information may be either traditional paper-based material or displayed electronically. If the source of aeronautical information is in electronic format, operators must determine non-interference with the G1000 system and existing aircraft systems for all flight phases.

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SECTION 2
LIMITATIONS

2.1 INTRODUCTION

GENERAL LIMITATIONS

1. The Garmin G1000 Cockpit Reference Guide (CRG) must be immediately available to the flight crew. The required CRG is referenced to the System Software Version number. The System Software Version number is displayed at the top right side of the MFD Power-up page.

System Software Version	Garmin G1000 Cockpit Reference Guide (CRG) revision
0321.23	P/N 190-00324-11, Revision B, or later appropriate revision.

2. AHRS Areas of operation:

Flight operations with the G1000 Integrated Avionics installed are prohibited in the following areas due to unsuitability of the magnetic fields near the Earth's poles.

a) North of 72° North latitude at all longitudes.

b) South of 70° South latitude at all longitudes.

c) North of 65° North latitude between longitude 75° W and 120° W. (Northern Canada)

d) North of 70° North latitude between longitude 70° W and 128° W. (Northern Canada)

e) North of 70° North latitude between longitude 85° E and 114° E (Northern Russia)

f) South of 55° South latitude between longitude 120° E and 165° E. (Region south of Australia and New Zealand)

NOTE

The Garmin G1000 system is not designed for use as a polar navigator and operation outside the approved operating area is prohibited. The GRS-77 AHRS internally monitors the magnetic field and will display a GEO LIMITS system message when the magnetic field becomes unsuitable for AHRS operation. When the AHRS can no longer reliably compute heading, heading information will be removed form the HSI.

3. The fuel quantity, fuel required, and fuel remaining functions of the FMS are supplemental information only and must be verified by the flight crew.

4. The ADF aural identifier must be monitored any time the ADF is used as the primary source of navigation.

5. Do not use SafeTaxi or Chartview functions as the basis for ground maneuvering. SafeTaxi and Chartview functions do not comply with the requirements of AC 20-159 and are not qualified to be used as an airport moving map display (AMMD). SafeTaxi and Chartview are to be used by the flight crew to orient themselves on the airport surface to improve situational awareness during ground operations.

6. Do not move the aircraft until the AHRS has aligned and displays valid attitude information on the PFD after the G1000 system has been turned on.

G1000 GPS NAVIGATION SYSTEM LIMITATIONS

1. GPS/SBAS based IFR enroute, oceanic, and terminal navigation is prohibited unless the pilot verifies and uses a valid, compatible, and current Aviation database or verifies each waypoint for accuracy by reference to current approved data.

2. "GPS", "or GPS", and "RNAV (GPS)" instrument approaches using the G1000 System are prohibited unless the pilot verifies and uses the current Aviation database. GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the Aviation database.

3. Instrument approaches utilizing the GPS receiver must be conducted in the approach mode (LNAV, LNAV+V, L/VNAV, or LPV), and GPS/WAAS integrity monitoring must be available at the Final Approach Fix. If there is not sufficient GPS/WAAS integrity at any time after crossing the Final Approach Fix, a Loss Of Integrity (LOI) will be annunciated on the HSI and the approach mode will be aborted.

4. Only applicable to GIA 63W equipped aircraft: When operating under instrument flight rules requiring an alternate airport, the required alternate airport must not be flight planned based on an RNAV (GPS) LP/LPV or LNAV/VNAV approach. The alternate airport must be flight planned using an LNAV approach or available ground-based approach aid.

5. Only applicable to GIA 63 (non-WAAS) equipped aircraft: The aircraft must have operational, approved navigation equipment other than GPS appropriate to the operation.

6. Only applicable to GIA 63 (non-WAAS) equipped aircraft: When operating under instrument flight rules requiring an alternate airport, the required alternate airport must have an approved instrument approach procedure other than GPS that is anticipated to be operational and available at the estimated time of arrival, and which the aircraft is equipped to fly.

7. IFR non-precision approach approval using the GPS/SBAS sensor is limited to published approaches within the U.S. National Airspace System. Approaches to airports in other airspace are not approved unless authorized by the appropriate governing authority.

8. Use of the Garmin G1000 GPS/SBAS receivers to accomplish ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for "or GPS" is not authorized. Use of the G1000 VOR/LOC/GS receivers to fly approaches not approved for "or GPS" requires that VOR/LOC/GS navigation data is selected and presented on the CDI of the pilot flying (i.e. proper CDI source selection).

NOTE

Not all published approaches are in the AVIATION database. The flight crew must ensure that the planned approach is in the database.

9. Use of the G1000 VOR/ILS receiver to fly approaches not approved for GPS requires VOR/ILS navigation data to be present on the display.

10. When conducting missed approach procedures, autopilot coupled operation is prohibited until the pilot has established a course and rate of climb that ensures all altitude and path requirements of the procedure will be met.

11. RNP operations are not authorized except as noted in the Operational Approvals section.

GFC 700 LIMITATIONS

1. The GFC 700 AFCS preflight test must be successfully completed prior to use of the autopilot, flight director or manual electric trim. Use of the autopilot or manual electric trim system is prohibited if the preflight test is not satisfactorily completed.

2. A pilot with the seat belt fastened must occupy the left pilot's seat during all autopilot operations.

3. The autopilot must be off during takeoff and landing.

4. Autopilot maximum engagement speed – 165 KIAS
   Autopilot minimum engagement speed – 70 KIAS
   Electric Trim maximum operating speed – 178 KIAS

5. The autopilot must be disengaged below 200 feet AGL during approach operations and below 800 feet AGL during all other operations.

6. ILS approaches using the GFC 700 autopilot/flight director are limited to Category I approaches only.

TERRAIN AWARNESS AND WARNING SYSTEM (TAWS) SYSTEM LIMITATIONS

NOTE:
The terrain display is intended to serve as a situational awareness tool only. It may not provide either the accuracy or fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles.

1. Navigation must not be predicated upon the use of the TAWS, Terrain or Obstacle data displayed by the G1000.
2. Pilots are authorized to deviate from their ATC clearance to the extent necessary to comply with terrain / obstacle warnings from TAWS.
3. The Terrain and Obstacle databases have an area of coverage as detailed below:

   (a) The Terrain Database has an area of coverage from North 90° Latitude to South 90° Latitude in all longitudes.

   (b) The Obstacle Database coverage area includes the United States and Europe.

   NOTE: The area of coverage may be modified, as additional terrain data sources become available.

4. When replacing or updating the TAWS terrain and obstacle database cards, the following procedure must be conducted:

   - The G1000 system must be turned off.
   - After database card replacement, apply power to the G1000 system to perform a TAWS system test. A successful TAWS system test will result in the aural “TAWS SYSTEM TEST OK” message being played and removal of the “TAWS TEST” annunciator from the PFD and MFD displays.
   - Turn the G1000 system off.

5. To avoid unwanted alerts, TAWS must be inhibited when landing at an airport that is not included in the airport database.

TRAFFIC AVOIDANCE SYSTEM LIMITATIONS

Use of the MAP - TRAFFIC MAP to maneuver the airplane for traffic avoidance without outside visual reference is prohibited. The Traffic Information System (TIS) is intended as an aid for the pilot to visually locate traffic. It is the responsibility of the pilot to see and manually maneuver the airplane to avoid other traffic.

SYNTHETIC VISION LIMITATIONS

Use of the Synthetic Vision system display elements alone for aircraft control without reference to the G1000 primary flight instruments or the aircraft standby instruments is prohibited.

Use of the Synthetic Vision system alone for navigation, or obstacle or terrain avoidance is prohibited.

Use of the SVS traffic display alone to avoid other aircraft is prohibited.

DATA LINK WEATHER (XM AND GFDS WEATHER) LIMITATIONS

Datalink weather information displayed by the G1000 system is limited to supplemental use only. XM and GFDS weather data is not a source of official weather information. Use of the NEXRAD and LTNG (Lightning) data on the MAP – NAVIGATION MAP and/or MAP - WEATHER DATA LINK (XM) or (GFDS) page for hazardous weather, e.g., thunderstorm penetration is prohibited. NEXRAD, and LTNG information on the MAP - NAVIGATION or MAP – WEATHER DATA LINK (XM) or (GFDS) page is intended only as an aid to enhance situational awareness of hazardous weather, not penetration. It is the pilot's responsibility to avoid hazardous weather using official weather data sources and the airplane's in-flight weather radar (if installed).

VERTICAL NAVIGATION (VNAV) LIMITATIONS

Use of VNAV is prohibited with course changes greater than 90°.

2.3 AIRSPEED MARKINGS

Marking	IAS	Significance
Red band	20 KIAS – 53 KIAS	Low speed awareness – stall is imminent
Yellow band	53 KIAS – 58 KIAS	Low speed awareness – reduced airspeed margin to stall
White band	58 KIAS – 91 KIAS	Operating range with flaps fully extended
Green band	58 KIAS – 129 KIAS	Normal operating range
Yellow band	129 KIAS – 178 KIAS	Caution range – smooth air only
Red band	178 KIAS and greater	178 KIAS is the maximum speed for all operations

The airspeed indicator is marked in IAS values.

2.5 ENGINE INSTRUMENT MARKINGS

Engine instrument markings and their color code significance are shown in the table below.

NOTE

When an indication lies in the upper or lower prohibited range, the legend for that display will change to the color of the prohibited range and will flash.

Indication	Red arc or bar = Lower prohibited range	Yellow arc or bar = Caution range	Green arc or bar = Normal operating range	Yellow arc or bar = Caution range	Red arc or bar = Upper prohibited range
Manifold Pressure In. – Hg ***Note 2***	--	--	13 – 30	--	--
RPM	--	--	500 – 2700	--	>2700 ***Note 3***
Oil Temp °F	--	--	149 – 230	231 - 245	>245
Cylinder Head Temp °F	--	--	150 – 475	476 – 500	>500
Fuel Press PSI (DA 40) ***Note 4***	0 – 14	--	14 – 35	--	>35
Oil Press PSI	0 – 25	25 - 55	56 – 95	96 - 97	>97
Fuel flow Gal/hr	--	--	1 – 20	--	>20
Voltage Volts	0 – 24.1	24.1 – 25	25.1 – 30	30.1 – 32	>32
Amperage Amps	--	--	2 – 75	--	--
Fuel quantity US gal Standard Tanks	0	>0 – 3	>3 – 17	--	--
Fuel quantity US gal Long Range Tanks	0	>0 – 3	>3 – 16 >19 – 24	--	--

Note 2: Not applicable to DA 40 F. Manifold Pressure gauge is not installed in the DA 40 F.

Note 3: To prevent nuisance alerts during normal takeoffs, the legend "RPM" and digits will not turn red or flash until the RPM exceeds 2780.

Note 4: Fuel Pressure Gauge is optional for DA 40 aircraft.

2.6 WARNING, CAUTION AND STATUS MESSAGES

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G1000 displays.

NOTE

The G1000 Cockpit Reference Guide and the G1000 Pilot's Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.

Warning annunciations – Red	
Annunciation	**Cause**
OIL PRES LO	Oil pressure is less than 25 psi
FUEL PRES LO (DA40 Only)	Fuel pressure is less than 14 psi
FUEL PRES HI (DA40 Only)	Fuel pressure is greater than 35 psi
ALTERNATOR	Alternator failure
STARTER ENGD	Operation of the starter without the key in the start position, or failure of the starter motor to disengage from the engine after starting
DOOR OPEN	Front canopy and/or rear door not completely closed and locked

Caution annunciations – Yellow	
Annunciation	**Cause**
PITOT OFF	Pitt heat is not switched on
PITOT FAIL	Fault in the pitot heating system
L FUEL LOW	Fuel quantity in the left tank is less than 3 US gal (±1 US gal)
R FUEL LOW	Fuel quantity in the right tank is less than 3 US gal (±1 US gal)
LOW VOLTS	On-board voltage below 24 volts
PFD FAN FAIL	PFD Cooling Fan has failed. See Abnormal Procedures section 4B.
MFD FAN FAIL	MFD Cooling Fan has failed. See Abnormal Procedures section 4B.
GIA FAN FAIL	GIA Cooling Fan has failed. See Abnormal Procedures section 4B.
PFD OVERHEAT	PFD is approaching its operating temperature limit. Display brightness is automatically reduced to 50% of maximum. See Abnormal Procedures section 4B.
MFD OVERHEAT	MFD is approaching its operating temperature limit. Display brightness is automatically reduced to 50% of maximum. See Abnormal Procedures section 4B.
GIA1 OVERHEAT	GIA 1 is approaching its operating temperature limit. See Abnormal Procedures section 4B of the AFMS.
GIA2 OVERHEAT	GIA 2 is approaching its operating temperature limit. See Abnormal Procedures section 4B of this AFMS.

2.13 KINDS OF OPERATION

Minimum operational equipment (serviceable)

Equipment	Number installed	VFR Day	VFR Night	IFR
Primary Flight Display	1	1	1	1
Multi-Function Display	1	1	1	1
Audio panel	1	1	1	1
Air data computer	1	1	1	1
Attitude and Heading Reference System	1	0	1	1
Static dischargers	7	0	0	7
GPS	2	0	1	2
PFD Cooling Fan	1	0	1	1
MFD Cooling Fan	1	0	1	1
GIA Cooling Fan	1	0	1	1

2.14 FUEL

Fuel Quantity: Total fuel quantity:
- Standard Tanks: 2 x 20.6 US gal (approx. 156 liters)
- Long Range Tanks: 2 x 25.5 US gal (approx. 193 liters)

Unusable fuel: 2 x 0.5 US gal (approx. 3.8 liters)

Max. Indicated Fuel Quantity:
- Standard Tanks: 17 US gal per tank
- Long Range Tanks: 24.0 US gal per tank

Max. permissible difference between right and left tank:
- Standard Tanks: 10 US gal (approx. 38 liters)
- Long Range Tanks: 8 US gal (approx. 30.3 liters)

2.15 Limitation Placard

Below the MFD, next to the fuel quantity indication:

Standard Tanks

Fuel qty. Indication: max 17 US gal
Max. difference LH/RH tank: 10 US gal
For use of max. tank capacity see AFM

Long Range Tanks

Fuel qty. Indication: max 24 US gal
Refer to AFM to use entire tank capacity
Max. difference LH/RH tank: 8 US gal

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SECTION 3
EMERGENCY PROCEDURES

GENERAL

1. If Garmin G1000 GPS navigation information is not available or invalid, utilize remaining operational navigation equipment as required.

2. If the G1000 system reverts to Dead Reckoning mode (indicated by DR displayed on the HSI), the moving map will continue to be displayed. Aircraft position will be based upon the last valid GPS position and estimated by Dead Reckoning methods. Changes in winds aloft can affect the estimated position substantially. Dead Reckoning is only available for 20 minutes in Oceanic and Enroute modes; Terminal and Approach modes do not support DR.

3. If Garmin G1000 GPS navigation information is not available or invalid and the TAWS option is installed, TAWS will not be available. A white 'TAWS N/A' or red 'TAWS FAIL' annunciator will be displayed on the PFD (left of selected altitude) or on the MFD TAWS page (lower right hand corner).

4. If the "GPS NAV LOST" annunciation is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the G1000 VOR/ILS receivers or an alternate means of navigation other than the G1000 GPS receivers.

5. If the "LOI" (Loss of Integrity) annunciation is displayed in the enroute, oceanic, or terminal phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the G1000 GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the G1000 VOR/ILS receiver or another IFR-approved navigation system.

6. If the "ABORT APR" or "GPS NAV LOST" annunciation is displayed while on an approach segment, the pilot shall initiate the missed approach.

7. Aircraft equipped with GIA 63W WAAS GPS receivers only: If the "APR DWNGRADE" annunciation is displayed, the pilot shall use LNAV minima.

8. Aircraft equipped with GIA 63 non-WAAS GPS receivers only: If the "RAIM UNAVAIL" annunciation is displayed while on an approach segment, the approach will become inactive and the pilot shall initiate the missed approach. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity.

9. In an in-flight emergency, depressing and holding the COM transfer button for 2 seconds will tune the emergency frequency of 121.500 MHz. If the display is available, it will also show it in the "Active" frequency window.

10. If the white 'TAWS N/A' status annunciator is displayed on the PFD or MFD TAWS page, the system will no longer provide TAWS alerting or display relative terrain elevations. The crew must maintain compliance with procedures that ensure minimum terrain separation.

11. If the red 'TAWS FAIL' status annunciator is displayed on the PFD or MFD TAWS page, the system will no longer provide TAWS alerting or display relative terrain elevations. The crew must maintain compliance with procedures that ensure minimum terrain separation.

12. The following warnings and cautions appear in various locations on the PFD or MFD.

Annunciation	Cause
AHRS Aligning – Keep Wings Level	Attitude and Heading Reference System is aligning. Keep wings level using standby attitude indicator.
ATTITUDE FAIL	Display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area.
AIRSPEED FAIL	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
ALTITUDE FAIL	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
VERT SPEED FAIL	Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.
HDG	Display system is not receiving valid heading input from the AHRS; accompanied by a red X through the digital heading display.
Red X	A red X through any display field, such as com frequencies, nav frequencies, or engine data, indicates that display field is not receiving valid data.
LOI	GPS integrity is insufficient for the current phase of flight.

GFC 700 EMERGENCY PROCEDURES

Some emergency situations require immediate memorized corrective action. These numbered steps are printed in boxes within the emergency procedures and should be accomplished without the aid of the checklist.

AUTOPILOT OR ELECTRIC TRIM MALFUNCTION/FAILURE

NOTE

An autopilot or electric trim malfunction may be recognized by an unexpected deviation from the desired flight path, abnormal flight control or trim wheel movement, or flight director commands which cause unexpected or contradictory information on the other cockpit displays. It may be accompanied by the aural autopilot disconnect tone, a red AFCS, red AP or yellow AP indication on the PFD, or a yellow CHECK ATTITUDE on the PFD. The autopilot and AHRS monitors normally detect failures and automatically disconnect the autopilot.

Failure of the electric pitch trim, indicated by a red boxed PTRM indication on the PFD, may not cause the autopilot to disconnect. Be alert to possible autopilot out of trim conditions (see AUTOPILOT OUT OF TRIM procedure below), and expect residual control forces upon disconnect. The autopilot will not re-engage after disconnect with failed pitch trim. If AUTOPILOT OUT OF TRIM ↑↓ELE indication is present, expect substantial elevator forces on autopilot disconnect.

1. AP DISC Switch.....DEPRESS AND HOLD while grasping control stick firmly
2. Aircraft Attitude.....MAINTAIN/REGAIN AIRCRAFT CONTROL, use standby attitude indicator if necessary

3. Pitch Trim .....RETRIM if necessary, using the trim wheel
4. AP Circuit Breaker..... PULL
5. AP DISC Switch ..... RELEASE

WARNING

FOLLOWING AN AUTOPILOT, AUTOTRIM OR MANUAL ELECTRIC TRIM SYSTEM MALFUNCTION, DO NOT ENGAGE THE AUTOPILOT OR OPERATE THE MANUAL ELECTRIC TRIM UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN CORRECTED.

AUTOPILOT DISCONNECT (Red AP flashing on PFD)

1. AP DISC Switch ..... DEPRESS AND RELEASE (to cancel disconnect tone)
2. Pitch Trim .....RETRIM if necessary, using the trim wheel

NOTE

The autopilot disconnect may be accompanied by a red boxed PTCH (pitch) or ROLL on the PFD, indicating the axis which has failed. The autopilot cannot be re-engaged with either of these annunciations present.

AUTOPILOT OVERSPEED RECOVERY (Yellow MAXSPD on PFD)

1. Throttle.....REDUCE

When overspeed condition is corrected:

2. Autopilot ..... RESELECT VERTICAL MODE (if necessary)

NOTE

Overspeed recovery mode provides a pitch up command to decelerate the airplane at or below the maximum autopilot operating speed (165 KIAS). Overspeed recovery is not active in altitude hold (ALT) or glideslope (GS) modes.

LOSS OF NAVIGATION INFORMATION (Yellow VOR, VAPP, GPS or LOC flashing on PFD)

NOTE

If a navigation signal is lost while the autopilot is tracking it, the autopilot will roll the aircraft wings level and default to roll mode (ROL).

1. Autopilot ..... SELECT HDG on mode controller
2. Nav Source..... SELECT A VALID NAV SOURCE
3. Autopilot ..... SELECT NAV or APR on mode controller

If on an instrument approach at the time the navigation signal is lost:

4. Missed Approach Procedure ..... EXECUTE (as applicable)

AUTOPILOT OUT OF TRIM (Yellow ←AIL, AIL→, ↑ELE, or ↓ELE on PFD)

For ↑ELE, or ↓ELE Indication:

WARNING

DO NOT ATTEMPT TO OVERPOWER THE AUTOPILOT IN THE EVENT OF A PITCH MISTRIM. THE AUTOPILOT SERVOS WILL OPPOSE PILOT INPUT AND WILL CAUSE PITCH TRIM TO RUN OPPOSITE THE DIRECTION OF PILOT INPUT. THIS WILL LEAD TO A SIGNIFICANT OUT-OF-TRIM CONDITION RESULTING IN LARGE CONTROL STICK FORCE WHEN DISENGAGING THE AUTOPILOT.

CAUTION

Be prepared for significant sustained control forces in the direction of the annunciation arrow. For example, an arrow pointing down indicates nose down control stick force will be required upon autopilot disconnect.

NOTE

Momentary illumination (5 sec or less) of the ↑ELE or ↓ELE indication during configuration or large airspeed changes is normal.

If the annunciation remains:

1. AP DISC Switch..... DEPRESS AND HOLD while grasping control stick firmly
2. Aircraft Attitude ..... MAINTAIN/REGAIN AIRCRAFT CONTROL, use standby attitude indicator if necessary

3. Pitch Trim ..... RETRIM if necessary, using the trim wheel
4. AFCS Circuit Breaker..... PULL
5. AP DISC switch..... RELEASE

WARNING

FOLLOWING AN AUTOPILOT, AUTOTRIM OR MANUAL ELECTRIC TRIM SYSTEM MALFUNCTION, DO NOT ENGAGE THE AUTOPILOT OR OPERATE THE MANUAL ELECTRIC TRIM UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN CORRECTED.

For ←AIL, AIL→ Indication:

1. Rudder Trim..... VERIFY slip/skid indicator is centered

NOTE

Observe the maximum fuel imbalance limitation.

If annunciation remains:
2. Control Stick.....GRASP FIRMLY with both hands

CAUTION

Be prepared for sustained control forces in the direction of the annunciation arrow. For example, an arrow pointing to the right indicates that sustained right wing down control stick force will be required upon autopilot disconnect.

3. AP DISC Switch .....DEPRESS
4. Autopilot ..... RE-ENGAGE if lateral trim re-established

FLASHING YELLOW MODE ANNUNCIATION

NOTE

Abnormal mode transitions (those not initiated by the pilot or by normal sequencing of the autopilot) will be annunciated by flashing the disengaged mode in yellow on the PFD. Upon loss of a selected mode, the system will revert to the default mode for the affected axis, either ROL or PIT. After 10 seconds, the new mode (PIT or ROL) will be annunciated in green.

Loss of selected vertical mode (FLC, VS, ALT, GS, VPTH, GP)
1. Autopilot mode controls ..... SELECT ANOTHER VERTICAL MODE

If on an instrument approach:
2. Autopilot.....DISCONNECT and continue manually, or execute missed approach

Loss of selected lateral mode (HDG, NAV, GPS, LOC, VAPP, BC):
1. Autopilot mode controls .....SELECT ANOTHER LATERAL MODE

If on an instrument approach:
2. Autopilot.....DISCONNECT and continue manually, or execute missed approach

FAILURE OF THE PREFLIGHT TEST (Red boxed PFT on PFD)

1. AFCS Circuit Breaker.....PULL

WARNING

DO NOT ATTEMPT TO ENGAGE THE AUTOPILOT OR OPERATE THE MANUAL ELECTRIC TRIM UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN CORRECTED.

NOTE

When the AFCS circuit breaker is pulled, the PFT FAIL annunciation will be removed and the autopilot and manual electric trim will be unavailable. Do not reset the circuit breaker unless the airplane is on the ground.

MAXIMUM ALTITUDE LOSS DUE TO AUTOPILOT, FLIGHT DIRECTOR OR AHRS MALFUNCTIONS:

MANEUVER	ALTITUDE LOSS
Climb, Cruise, Descent	200 feet
Maneuvering	115 feet
Approach	130 feet

3.2.3 ENGINE PROBLEMS IN FLIGHT

(h) High Fuel Flow – (DA 40 only)

Fuel flow in red sector

1. Fuel pressure .....check for red FUEL PRESS LO message

   - If fuel pressure is low (FUEL PRESS LO message), there is possibly a leak (between the injection system and the injectors). Land at the nearest available airport.
   - If there is no FUEL PRESS LO message, there is no leak; the likely cause is a defective fuel flow indication, which should thus be ignored (the airplane should be serviced). Fuel flow data should be taken from the engine performance table in Chapter 5 of the AFM.

(g) High Fuel Flow – (DA 40 F only)

1. Fuel Quantity ..... Check and Monitor
2. Power Setting..... Check

Land as soon as practical. Consider the reduced range and endurance due to possible loss of fuel.

NOTE

Have the airplane inspected before next flight.

3.3.3 SMOKE AND FIRE IN FLIGHT

(b) Electrical fire with smoke in flight

1. Emergency switch..... ON if installed

CAUTION

Switching OFF the master switch (ALT/BAT) will lead to total loss of all electronic and electric equipment, including the AHRS and attitude display. However, by switching the HORIZON EMERGENCY switch ON, the emergency battery will supply power to the standby attitude gyro (artificial horizon) and the flood light.

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

2. Master switch (ALT/BAT) ..... OFF
3. Cabin heat ..... OFF
4. Emergency window(s) ..... OPEN
5. Use standby instruments for airspeed, altitude and attitude reference, if necessary
6. Land at the nearest suitable airport as soon as possible

   If electronic or avionics equipment is required for continued flight, the following procedure may be used to isolate the source of the smoke or fumes:

7. BAT (battery) switch ..... ON
8. ESS BUS switch ..... ON

NOTE

This removes power from the main and avionics busses, and does not allow alternator operation. See the table at the end of this section for the equipment which is still available.

If smoke or fumes decrease:

9. Land at the nearest suitable airport as soon as possible

If smoke or fumes persist:

10. ALT (alternator) switch ..... ON
11. ESS BUS switch .....OFF
12. BATT and ESS TIE circuit breakers ..... PULL

    This removes power from the essential bus and restores power to the main and avionics busses. See the table at the end of this section for the equipment which will still be available.

13. Use standby instruments for attitude, airspeed and altitude
14. Refer to Section 3.7.2 (b) of this Supplement, Alternator Failure
15. Land at the nearest suitable airport as soon as possible
    The equipment available on **Essential Bus** only (operating on battery only and the Essential Bus switch selected) is:

    Air Data Computer (airspeed, altitude, vertical speed, OAT, TAS)
    Attitude and Heading Reference System (attitude, heading)
    PFD (in composite mode)
    Pitot Heat
    Flaps
    COM 1
    GPS/NAV 1
    Transponder
    Landing light
    Instrument flood lights
    Engine instruments
    Starter

Refer to the “Essential Bus” area of the circuit breaker panel for a quick reference to equipment on the Essential Bus.

Equipment available on the **Main and Avionics Busses** only:

COM 2
GPS/NAV 2
MFD
Electric fuel pump
Instrument lights
Strobe lights
Position lights
Taxi light

Refer to the “Main Bus” and “Avionics Bus” areas of the circuit breaker panel for a quick reference to equipment on those busses.

3.7.1 ICING

Unintentional flight into icing conditions

1. Leave the icing area (by changing altitude or turning back, in order to reach zones with a higher ambient temperature).
2. Pitot heating ..... ON
3. Cabin heat ..... ON
4. Air distribution lever ..... ▲(UP)
5. RPM ..... increase, in order to prevent ice build-up on the propeller blades
6. Alternate Air (**DA 40 only**) ..... OPEN

6a Carburetor Heat (**DA 40 F only**) ..... HOT

7. Emergency window(s) ..... open if required

CAUTION

Ice build-up increases the stalling speed. If required for safety reasons, engine speeds up to 2700 RPM are permissible without time limit.

8. ATC ..... advise if an emergency is expected

CAUTION

When the pitot heating fails (yellow PITOT FAIL annunciation), and the alternate static valve is installed:

9. Alternate static valve ..... OPEN
10. Emergency window(s) ..... close

3.7.2 FAILURES IN THE ELECTRICAL SYSTEM

(b) Alternator failure

An alternator failure is indicated by a red ALTERNATOR message and an ammeter indication of 0 Amps.

1. Circuit breakers..... Check in
2. ALT (alternator) switch ..... OFF, then ON

   If alternator does not come back on line (message extinguishes and ammeter indication greater than zero):

3. ESS BUS switch ..... ON
4. Switch off any non-essential electrical loads.
5. Land within 30 minutes

   If PFD attitude information is lost prior to landing:

6. HORIZON EMERGENCY Switch..... ON

CAUTION

The following items are available on the Essential Bus:

- PFD in composite (backup) format
- NAV/COM 1
- GPS 1
- Attitude and Heading Reference System (AHRS)
- Air Data Computer
- Pitot heat
- Engine instruments
- Transponder
- Flood light
- Landing light

Refer to the ESSENTIAL BUS area of the circuit breaker panel for a quick reference to equipment on those busses. These items of equipment can be supplied with power by the battery for at least 30 minutes. During this 30-minute period, the airplane must be landed at a suitable airport. Economical use of electrical equipment, in particular of pitot heat, and switching off equipment that is not needed extends the time during which the other equipment remains available.

For cases in which the battery capacity is not sufficient to reach a suitable airport, an emergency battery is installed to power the standby attitude gyro and floodlight. This battery is switched on with the HORIZON EMERGENCY Switch. It provides power for 1 hour and 30 minutes when the floodlight is switched on.

3.8 AVIONICS EMERGENCIES

3.8.1 PFD OR MFD DISPLAY FAILURE

a) DISPLAY BACKUP button on audio panel…PUSH (button shall be OUT)

3.8.1.1 AUTOMATIC ENTRY OF DISPLAY REVERSIONARY MODE

If the PFD and MFD have automatically entered reversionary mode, use the following procedure:

a) DISPLAY BACKUP button on audio panel…PUSH (button shall be OUT)

NOTE

After automatic entry of reversionary mode, it is required to press the DISPLAY BACKUP button on the audio panel. With the DISPLAY BACKUP button pushed, if the problem causing the automatic entry of reversionary mode is resolved the system will remain in reversionary mode. A maximum of one attempt to return to normal mode may be made using the following procedure.

b) DISPLAY BACKUP button on audio panel……PUSH (button shall be IN)

- If the system returns to normal mode, leave the DISPLAY BACKUP button in and continue.
- If the system remains in reversionary mode, or abnormal display behavior such as display flashing occurs, then return the DISPLAY BACKUP button to the OUT position.

3.8.2 AHRS FAILURE

NOTE

A failure of the Attitude and Heading Reference System (AHRS) is indicated by removal of the sky/ground presentation and a red X and a yellow "AHRS FAILURE" shown on the PFD. The digital heading presentation will be replaced with a yellow "HDG" and the compass rose digits will be removed. The course pointer will indicate straight up and course may be set using the digital window.

1. Use Standby Attitude Indicator, magnetic compass and Navigation Map
2. Course ..... Set using digital window

3.8.3 AIR DATA COMPUTER (ADC) FAILURE

NOTE

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some FMS functions, such as true airspeed and wind calculations, will also be lost.

1. Use Standby Airspeed Indicator and Altimeter
2. Land as soon as practical at a suitable airport

3.8.4 ERRONEOUS OR LOSS OF ENGINE AND FUEL DISPLAYS

NOTE

Loss of an engine parameter is indicated by a red X through the data field. Erroneous information may be identified by indications that do not agree with other system information. Erroneous indications may be determined by comparing a display with other displays and other system information.

1. Set power based on throttle lever position, engine noise, and speed.

2. Monitor other indications to determine the health of the engine.

3. Use known power settings from the AFM for approximate fuel flow values.

4. Use other system information, such as annunciator messages, ENGINE SYSTEM page, and AUX – TRIP PLANNING page to safely complete the flight.

3.8.5 ERRONEOUS OR LOSS OF WARNING/CAUTION ANNUNCIATORS

NOTE

Loss of an annunciator may be indicated when engine or fuel displays show an abnormal or emergency situation and the annunciator is not present. An erroneous annunciator may be identified when an annunciator appears which does not agree with other displays or system information.

1. If an annunciator appears, treat it as if the condition exists. Refer to the AFM Emergency or Abnormal procedures or the procedures contained in this AFMS.

2. If a display indicates an abnormal condition but no annunciator is present, use other system information, such as engine displays, ENGINE SYSTEM page, GAL REM and FFLOW GPH displays, to determine if the condition exists. If it cannot be determined that the condition does not exist, treat the situation as if the condition exists. Refer to the AFM Emergency or Abnormal procedures or the procedures contained in this AFMS.

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
GARMIN G1000 INTEGRATED AVIONICS SYSTEM
WITH GARMIN GFC 700 AUTOPILOT

DIAMOND MODEL DA 40
DIAMOND MODEL DA 40 F

SECTION 4A
NORMAL PROCEDURES

NOTE

Readability of the PFD and MFD displays may be degraded when wearing polarized sunglasses.

1. DETAILED OPERATING PROCEDURES

Normal operating procedures for the G1000 and GFC 700 are described in the Garmin G1000 Cockpit Reference Guide and the Garmin G1000 Pilot's Guide.

PRE-FLIGHT INSPECTION

I. Cabin check

a) MET, NAV, Mass & CG ..... flight planning complete
b) Airplane documents ..... complete and up-to-date
c) Ignition key ..... pulled out
d) Front canopy & rear door ..... clean, undamaged
e) All electrical equipment ..... OFF
f) Circuit breakers ..... set in (if one has been pulled, check reason)
g) Engine control levers ..... check condition, freedom of movement
Full travel of throttle,
Full Travel of RPM (DA 40 only)
Full Travel of mixture lever
h) Throttle ..... IDLE
i) Mixture control lever ..... LEAN
j) RPM lever (DA 40 only) ..... HIGH RPM
k) Carburetor Heat (DA 40 F only) ..... COLD
l) BAT (battery) switch ..... ON
m) Fuel Quantity ..... check fuel qty. on EIS
check with fuel qty. measuring device

NOTE

FOR STANDARD TANKS, when the fuel quantity indicator reads 17 US gal the correct fuel quantity must be determined with the fuel quantity measuring device. If this measurement is not carried out, the fuel quantity available for flight planning is 17 US gal.

FOR LONG RANGE TANKS, when the fuel indicator reads 16 US gal the correct fuel quantity must be determined with the fuel quantity measuring device. There are 3 US gal of ungauged fuel from 16 to 19 US gal. If this measurement is not carried out, the fuel quantity available for flight planning is 16 US gal.

n) Position lights, strobe light (ACL's) ..... check
o) BAT (battery) switch ..... OFF
p) Check for loose items ..... complete
q) Flight controls and trim ..... free to move and correct
r) Baggage ..... stowed and secure

NOTE

Refer to DA 40 and DA 40 F AFMs to complete the Walk-Around check, visual inspection

BEFORE STARTING ENGINE

1. Preflight inspection ..... Complete
2. Rudder pedals ..... Adjusted and locked
3. Passengers ..... Instructed
4. Safety Harnesses ..... All on and fastened
5. Rear door ..... Closed and locked
6. Door lock (if installed) ..... Unblocked, key removed
7. Front canopy ..... Position 1 or 2 ("cooling gap")
8. Canopy lock (if installed) ..... Unblocked, key removed
9. Parking brake ..... Set
10. Flight controls ..... Freedom of movement and proper direction
11. Trim wheel ..... T/O
12. Friction device, throttle quadrant ..... Adjusted
13. Throttle ..... IDLE
14. Mixture control lever ..... LEAN
15. RPM lever (DA 40 only) ..... HIGH RPM
16. Carburetor heat (DA 40 F only) ..... COLD
17. Alternate air (DA 40 only) ..... CLOSED
18. Alternate Static Valve ..... CLOSED, if installed

19. Avionics master switch ..... OFF
20. Essential Bus switch ..... OFF

CAUTION

When the essential bus is switched ON, the battery will not be charged unless the essential tie relay bypass (OAM 40-126) is installed.

21. BAT (battery) switch ..... ON
22. Fuel tank selector ..... on fullest tank

WARNING

Never move the propeller by hand while the ignition is switched on, as it may result in serious personal injury.

Never try to start the engine by hand.

STARTING ENGINE (DA 40 only)

(a) Cold engine

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
3. Throttle ..... 3 cm (1.2 in) forward from IDLE (measured from rear of slot)
4. Mixture control lever ..... RICH for 3 – 5 sec, then LEAN
5. Throttle ..... 1 cm (0.4 in) forward from IDLE (measured from rear of slot)

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

CAUTION

The use of an external pre-heater and external power source is recommended whenever possible, in particular at ambient temperatures below 0°C (32°F), to reduce wear and abuse to the engine and electrical system. Pre-heat will thaw the oil trapped in the oil cooler, which can be congealed in extremely cold temperatures. After a warm-up period of approximately 2 to 5 minutes (depending on the ambient temperature) at 1500 RPM, the engine is ready for takeoff if it accelerates smoothly and the oil pressure is normal and steady.

6. Ignition Switch ..... START

When engine starts:

7. Mixture control lever ..... rapidly move to RICH
8. Oil pressure ..... green arc within 15 sec
9. Electrical fuel pump ..... OFF

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

10. ALT (alternator) switch ..... ON
11. Ammeter ..... Check
12. Fuel pressure ..... Check no messages illuminated
13. Annunciator section of PFD ..... Check

(b) Warm engine

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
3. Throttle ..... 3 cm (1.2 in) forward from IDLE (measured from rear of slot)
4. Mixture control lever ..... RICH for 1 - 3 sec, then LEAN

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Ignition switch ..... START

When engine starts:

6. Mixture control lever ..... rapidly move to RICH
7. Oil pressure ..... green arc within 15 sec

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

8. Electrical fuel pump ..... OFF
9. ALT (alternator) switch ..... ON
10. Ammeter ..... Check

11. Fuel pressure ..... Check no messages illuminated
12. Annunciator section of PFD ..... Check

(b) Engine will not start after injection ("flooded engine") Warm engine

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... ON, note pump noise (=Functional check of pump)
3. Mixture control lever ..... LEAN, fully aft
4. Throttle ..... at mid position

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Ignition switch ..... START
6. Throttle ..... pull back towards IDLE when engine starts

When engine starts:

7. Mixture control lever ..... rapidly move to RICH
8. Oil pressure ..... green arc within 15 sec

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF ENGINE and investigate problem.

9. ALT (alternator) switch ..... ON
10. Ammeter ..... Check
11. Fuel pressure ..... Check no messages illuminated
12. Annunciator section of PFD ..... Check

STARTING ENGINE (DA 40 F only)

(a) Cold engine

1. Strobe light (ACL) ..... ON
2. Mixture ..... fully RICH
3. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
4. Throttle ..... ¼ travel forward from IDLE
5. Prime ..... 1 – 4 seconds (electric pump)

WARNING

Use the primer system to prepare the engine for a starting attempt. Do not use the throttle to pump fuel through the carburetor to the engine for priming since this may lead to carburetor fire. The primer system delivers fuel to the cylinders directly.

CAUTION

The priming system is not intended for operation in flight.

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

CAUTION

The use of an external pre-heater and external power source is recommended whenever possible, in particular at ambient temperatures below 0°C (32°F), to reduce wear and abuse to the engine and electrical system. Pre-heat will thaw the oil trapped in the oil cooler, which can be congealed in extremely cold temperatures. After a warm-up period of approximately 2 to 5 minutes (depending on the ambient temperature) at 1500 RPM, the engine is ready for takeoff if it accelerates smoothly and the oil pressure is normal and steady.

6. Starter ..... engage

When engine starts:

7. Oil pressure ..... green arc within 15 sec
8. Throttle ..... set 1000 RPM
9. Electrical fuel pump ..... OFF

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF THE ENGINE and investigate problem.

10. ALT (alternator) switch ..... ON
11. Ammeter ..... Check
12. Annunciator section of PFD ..... Check

(b) Warm engine

1. Strobe light (ACL) ..... ON
2. Mixture ..... fully RICH
3. Electrical fuel pump ..... ON, note pump noise (=functional check of pump)
4. Throttle ..... ¼ travel forward from IDLE

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Starter ..... engage

When engine starts:

6. Oil pressure ..... green arc within 15 sec
7. Throttle ..... set 1000 RPM
8. Electrical fuel pump ..... OFF

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF THE ENGINE and investigate problem.

9. Master switch (ALT) ..... ON
10. Ammeter ..... Check
11. Annunciator section of PFD ..... Check

(c) Engine will not start after priming ("flooded engine")

1. Strobe light (ACL) ..... ON
2. Electrical fuel pump ..... OFF
3. Mixture ..... LEAN, fully aft
4. Throttle ..... MAX PWR

WARNING

Before starting the engine, the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool for 30 minutes before further start attempts.

5. Starter ..... engage

When engine starts:

6. Throttle ..... pull back towards IDLE when engine fires
7. Oil pressure ..... green arc within 15 sec

WARNING

If the oil pressure has not moved into the green arc within 15 seconds after starting, SWITCH OFF THE ENGINE and investigate problem.

8. Throttle ..... set 1000 RPM
9. ALT (alternator) switch ..... ON
10. Ammeter ..... Check
11. Annunciator section of PFD ..... Check

BEFORE TAXIING

1. Avionics master switch ..... ON
2. Electrical equipment ..... On as required
3. Flaps ..... UP – T/O – LDG – T/O (indicator and visual check)
4. Flight instruments and avionics ..... set, test function, as required (set both altimeters)
5. Flood light ..... ON, test function, as required
6. Ammeter ..... check, if required increase RPM
7. Fuel tank selector ..... change tanks, confirm that engine also runs on other tank (at least 1 minute at 1500 RPM)
8. Pitot heating ..... ON, test function – ..... (no yellow PITOT FAIL annunciation)
9. Pitot heating ..... OFF if not required ..... (yellow PITOT OFF annunciation)
10. Strobe lights (ACLs) ..... check ON, test function, ... as required
11. Position lights, landing and taxi lights ..... ON, test function, as required

CAUTION

When taxiing at close range to other aircraft, or during night flight in clouds, fog or haze, the strobe lights should be switched OFF. The position lights must always be switched ON during night flight.

12. Idle RPM ..... check, 600 to 800 RPM

NOTE

The GFC 700 AFCS system automatically conducts a preflight self-test upon initial power application. The preflight test is indicated by a white boxed PFT on the PFD. Upon successful completion of the preflight test, the PFT is removed, the red AFCS annunciation is removed, and the autopilot disconnect tone sounds.

13. Primary Flight Display (PFD) ..... NO AUTOPILOT ANNUNCIATIONS
14. Autopilot Disconnect Tone ..... NOTE
15. Autopilot ..... CHECK Pilot's AP DISC button
    a. Press AP to engage autopilot.
    b. Press Pilot's AP DISC button. Verify autopilot disconnects.
    c. Press FD to remove flight director as desired.
    d. Set trim to T/O.

BEFORE TAKE-OFF

1. Position airplane into wind if possible
2. Parking brake ..... set
3. Safety harnesses ..... on and fastened
4. Rear door ..... check closed and locked
5. Front canopy ..... closed and locked

CAUTION

When operating the canopy, pilots / operators must ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease the handle operation.

6. Door warning light (DOOR OPEN) ..... Check no messages illuminated
7. Fuel tank selector ..... fullest tank
8. Engine instruments ..... in green sector
9. Circuit breakers ..... pressed in
10. Fuel pressure ..... Check no messages illuminated
11. Electric fuel pump ..... ON
12. Mixture control lever ..... RICH (below 5000 ft)

NOTE

At a density altitude of 5000 ft or above or at high ambient temperatures, a fully rich mixture can cause rough running of the engine or a loss of performance. The mixture should be set for smooth running engine.

13. Flaps ..... check T/O
14. Trim ..... check T/O
15. Flight controls ..... free movement, correct sense
16. Throttle ..... 2000 RPM (DA 40)
    1800 RPM (DA 40 F)
17. Magneto check ..... L-BOTH-R-BOTH
    Max. RPM drop .....175 RPM
    Max. difference .....50 RPM

CAUTION

The lack of an RPM drop suggests a faulty ground or incorrect ignition timing. In case of doubt the magneto check can be repeated with a leaner mixture, in order to confirm a problem. Even when running on only one magneto the engine should not run unduly roughly.

18. RPM lever (DA 40 only) ..... pull back until a drop of max. 500 RPM is reached – HIGH RPM; Cycle 3 times

18a Carburetor Heat (DA 40 F only)..... check function
18b Throttle (DA 40 F only)..... MAX PWR, minimum 2200 RPM

NOTE (DA 40 F only)

The result of the ground check at full throttle depends on a number of environmental factors, e.g. temperature, ambient air pressure and in particular head or tailwind components. Headwind will cause a higher RPM than tailwind.

19. Throttle ..... set 1000 RPM
20. Carburetor Heat (DA 40 F only)..... check COLD
21. Alternate Air (DA 40 only)..... check CLOSED
22. Flight Plan..... entered
23. Altimeter setting ..... checked/set (G1000 and standby altimeter)
24. Altitude preselector..... set
25. Radios ..... set and checked
26. Transponder ..... code set
27. Standby attitude gyro ..... erect and no flag
28. Parking brake ..... release
29. Landing light..... ON as required

AFTER TAKEOFF – GFC 700 NORMAL PROCEDURES

WARNING

IT IS THE RESPONSIBILITY OF THE PILOT IN COMMAND TO MONITOR THE AUTOPILOT WHEN IT IS ENGAGED. THE PILOT SHOULD BE PREPARED TO IMMEDIATELY DISCONNECT THE AUTOPILOT AND TO TAKE PROMPT CORRECTIVE ACTION IN THE EVENT OF UNEXPECTED OR UNUSUAL AUTOPILOT BEHAVIOR.

DO NOT ATTEMPT TO MANUALLY FLY THE AIRPLANE WITH THE AUTOPILOT ENGAGED. THE AUTOPILOT SERVOS WILL OPPOSE PILOT INPUT AND WILL TRIM OPPOSITE THE DIRECTION OF PILOT INPUT (PITCH AXIS ONLY). THIS COULD LEAD TO A SIGNIFICANT OUT-OF-TRIM CONDITION. DISCONNECT THE AUTOPILOT IF MANUAL CONTROL IS DESIRED.

THE PILOT IN COMMAND MUST USE PROPER AUTOPILOT MODES AND PROPER ENGINE POWER SETTINGS TO ENSURE THAT AIRCRAFT SPEED IS MAINTAINED BETWEEN 70 KIAS AND 165 KIAS. IT WILL BE NECESSARY TO CHANGE ENGINE POWER TO MAINTAIN THE DESIRED RATE OF DESCENT WHEN OPERATING AT 165 KIAS.

OBSERVE THE MINIMUM AUTOPILOT OPERATING SPEED OF 70 KIAS. OPERATION IN PITCH (PIT), VERTICAL SPEED (VS), OR ALTITUDE HOLD (ALT) MODES BELOW THIS SPEED CAN RESULT IN AN AIRPLANE STALL. IF INDICATIONS OF AN AIRPLANE STALL ARE PRESENT, INCLUDING STALL WARNING HORN, LOSS OF CONTROL EFFECTIVENESS OR AIRFRAME BUFFET, DISCONNECT THE AUTOPILOT AND MANUALLY RETURN THE AIRPLANE TO STABILIZED FLIGHT PRIOR TO RE-ENGAGING THE AUTOPILOT.

NOTE

The NOSE UP and NOSE DN buttons on the mode controller on the MFD are referenced to aircraft movement. The NOSE UP button will increase the reference pitch attitude, increase the reference vertical speed and decrease the reference airspeed. Likewise, the NOSE DN button will decrease the reference pitch attitude, decrease the reference vertical speed, and increase the reference airspeed.

CLIMB, CRUISE and DESCENT:

Vertical Speed (VS):
1. Altitude Preselect.....SET to desired altitude
2. Mode Controller..... SELECT VS on mode controller
3. Vertical Speed Reference....ADJUST using NOSE UP and NOSE DN buttons
4. White ALT (altitude preselect armed) ..... NOTE on PFD
5. Green ALT..... VERIFY UPON ALTITUDE CAPTURE

NOTE

The vertical speed mode is limited to 1,500 ft/min climb and 3,000 ft/minute descent. Use engine power to maintain appropriate aircraft speed. If the CWS switch is used while in VS mode, the VS reference will change to the vertical speed existing when the CWS switch is released.

Flight Level Change (FLC):
1. Altitude Preselect.....SET to desired altitude
2. Mode Controller ..... SELECT FLC on mode controller
3. Airspeed Reference.....ADJUST using NOSE UP and NOSE DN buttons
4. White ALT (altitude preselect armed) ..... NOTE on PFD
5. Green ALT..... VERIFY UPON ALTITUDE CAPTURE

NOTE

If the airspeed reference cannot be maintained without deviating away from the selected altitude, the system will maintain level flight until the power or reference is changed to allow climbing or descending towards the selected altitude.

The FLC mode is limited to airspeeds between 70 KIAS and 165 KIAS. Use engine power to maintain appropriate vertical speed. If the CWS switch is used while in FLC mode, the airspeed reference will change to the airspeed existing when the CWS switch is released.

Altitude Hold (ALT):
To capture a selected altitude:
1. Altimeter Setting.....ADJUST TO APPROPRIATE VALUE
2. Altitude Preselect..... SET TO DESIRED ALTITUDE
3. Vertical Mode and Reference ..... SELECT on mode controller
4. White ALT (altitude preselect armed) ..... NOTE on PFD
5. Green ALT..... VERIFY UPON ALTITUDE CAPTURE

NOTE

In ALT mode, the autopilot will maintain the reference altitude shown in the autopilot window of the PFD regardless of the altitude in the altitude preselect window or the altimeter's barometric pressure setting. If the altimeter setting is changed, the autopilot will climb or descend to maintain the reference altitude.

Altitude Hold (ALT):
To maintain a desired altitude:
1. Altimeter Setting.....ADJUST TO APPROPRIATE VALUE
2. Reaching desired altitude.....SELECT ALT on mode controller
3. Green ALT.....VERIFY on PFD

Vertical Path (VPTH): (If equipped with optional GDU 1044)
1. Navigation Source..... SELECT GPS using CDI button on PFD
2. MFD flight plan page.....Enter Desired Vertical Profile
3. Altitude Preselect..... SET TO DESIRED ALTITUDE
4. Mode Controller.....SELECT VNV on mode controller
5. White VPTH (Vertical Path armed)..... NOTE on PFD
6. Green VPTH .....VERIFY UPON VERTICAL PATH CAPTURE

NOTE

If VNV is pressed and VPTH is armed prior to 5 minutes time to top of descent, VPTH will flash in white at 1 minute prior to top of descent. The pilot must acknowledge the flashing by pressing VPTH again.

Navigation Capture and Track:
1. Navigation Source.....SELECT VOR/LOC or GPS using CDI button on PFD
2. Course Bearing Pointer..... SET using course knob (VOR or OBS mode only)
3. Intercept Heading.....ESTABLISH in HDG or ROL mode (if required)
4. Mode Controller.....SELECT NAV on mode controller
5. Green or White VOR or GPS annunciation..... NOTE on PFD
6. Vertical Mode and Reference ..... SELECT on mode controller

NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the NAV mode and indicate VOR or GPS in white on the PFD. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV button is pressed and annunciate VOR or GPS in green on the PFD.

APPROACH:

VOR

1. Navigation Source..... SELECT VOR using CDI button on PFD
2. Course Bearing Pointer..... SET using course knob
3. Intercept Heading.....ESTABLISH in HDG or ROL mode (if required)
4. Mode Controller.....SELECT APR on mode controller
5. Green or White VAPP annunciation..... NOTE on PFD
6. Vertical Mode and Reference ..... SELECT on mode controller
7. Airspeed..... MAINTAIN 80 KIAS OR GREATER (Recommended)

NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the VAPP mode and indicate VAPP in white on the PFD. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the APR button is pressed and annunciate VAPP in green on the PFD.

ILS/LOC

1. Navigation Source.....SELECT LOC using CDI button on PFD
2. Course Bearing Pointer..... SET using course knob
3. Intercept Heading.....ESTABLISH in HDG or ROL mode (if required)
4. Mode Controller.....SELECT APR on mode controller
5. Green or White LOC and GS annunciations..... NOTE on PFD
6. Airspeed..... MAINTAIN 80 KIAS OR GREATER (Recommended)

NOTE

When the selected navigation source is a valid ILS, glideslope coupling is automatically armed when tracking the localizer. The glideslope cannot be captured until the localizer is captured. The autopilot can capture the glideslope from above or below the glideslope. If GS coupling is not desired it may be disabled by selecting NAV mode rather than APR mode.

GPS: LNAV

1. Navigation Source..... SELECT GPS using CDI button on PFD
2. Approach..... LOAD in FMS and ACTIVATE
3. Intercept Heading.....ESTABLISH in HDG or ROL mode (if required)
4. Mode Controller.....SELECT APR on mode controller
5. Green or White GPS annunciation..... NOTE on PFD
6. Vertical Mode and Reference ..... SELECT on mode controller

7. Airspeed ..... MAINTAIN 80 KIAS OR GREATER (Recommended)

GPS: LPV, LNAV/VNAV, LNAV+V (If equipped with optional GIA 63W GIA units)

1. Navigation Source..... SELECT GPS using CDI button on PFD
2. Approach..... LOAD in FMS and ACTIVATE
3. Intercept Heading.....ESTABLISH in HDG or ROL mode (if required)
4. Mode Controller.....SELECT APR on mode controller
5. Green or White GPS annunciation..... NOTE on PFD
6. Green or White GP annunciation..... NOTE on PFD
7. Airspeed ..... MAINTAIN 80 KIAS OR GREATER (Recommended)

Localizer Back Course (BC)

1. Navigation Source.....SELECT LOC using CDI button on PFD
2. Course Bearing Pointer .....SET to ILS front course using course knob
3. Intercept Heading.....ESTABLISH in HDG or ROL mode (if required)
4. Mode Controller.....SELECT NAV on mode controller
5. Green or White BC annunciation..... NOTE on PFD

NOTE

The course pointer must be at least 105° from the current magnetic heading before BC will be annunciated in the lateral mode field. Until that point, LOC will be annunciated.

Selecting NAV mode for back course approaches inhibits the glideslope from coupling.

6. Vertical Mode and Reference ..... SELECT on mode controller
7. Airspeed ..... MAINTAIN 80 KIAS OR GREATER (Recommended)

GO AROUND

1. Control Stick ..... GRASP FIRMLY
2. GA button .....PUSH – Verify GA/GA on PFD in lateral and vertical mode fields (autopilot will disconnect but flight director will still be available.)
3. Balked Landing..... EXECUTE
4. Missed Approach Procedure .....EXECUTE (as applicable)
5. Altitude Preselect ..... SET to appropriate altitude

At an appropriate safe altitude:

6. Autopilot Mode Controller ..... SELECT appropriate lateral and vertical modes on mode controller

7. Autopilot .....RE-ENGAGE if desired

NOTE

If the missed approach procedure requires tracking the localizer outbound from the airport, use NAV mode to prevent inadvertent coupling to glideslope.

AFTER TAKEOFF – TAWS NORMAL PROCEDURES
(If Optional TAWS system is installed)

TAWS CAUTION

When a TAWS CAUTION occurs, take positive corrective action until the alert ceases. Stop descending or initiate either a climb or a turn, or both, as necessary, based on analysis of all available instruments and information.

TAWS WARNING

If a TAWS WARNING occurs, immediately initiate and continue a climb that will provide maximum terrain clearance, or any similar approved vertical terrain escape maneuver, until all alerts cease. Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the pilot determines, based on all available information, that turning in addition to the escape maneuver is the safest course of action, or both.

TAWS INHIBIT

The TAWS Forward Looking Terrain Avoidance (FLTA) and Premature Descent Alerts (PDA) functions may be inhibited to stop alerting for acceptable flight conditions (such as below glideslope maneuvers). For detailed operating instructions regarding the G1000 TAWS Option, refer to the Garmin DA 40/DA 40F Pilot's Guide.

4B.3 FAILURES IN THE ELECTRICAL SYSTEM

(a) Low voltage caution (LOW VOLTS)

This caution is indicated when the normal on-board (bus) voltage (28V) drops below 24V.

Possible reasons are:

-A fault in the power supply

-RPM is too low

(i) Low voltage caution on the ground:

1. Engine speed.....1200 RPM
2. Electrical equipment .....OFF
3. Ammeter and voltmeter .....check

If the caution message does not extinguish, and the ammeter gauge legend flashes and the ammeter gauge reads zero, discontinue the flight.

(ii) Low voltage caution during flight:

1. Electrical equipment .....OFF if not needed
2. Ammeter and voltmeter .....check

If the caution message does not go out, and the ammeter legend flashes and the ammeter gauge reads zero, follow procedure 3.7.2(b) – Alternator Failure, in this Supplement.

(iii) Low voltage caution during landing:

-Follow (i) after landing

AVIONICS COOLING FAN FAILURES

NOTE

These caution messages are indicated when a cooling fan has failed. The avionics may overheat, especially in hot temperatures.

(a) PFD FAN FAIL caution

ON GROUND:
1. Do not takeoff in night or in instrument meteorological conditions.

IN FLIGHT:
1. Monitor for PFD OVERHEAT caution message.

(b) MFD FAN FAIL caution

ON GROUND:
1. Do not takeoff in night or in instrument meteorological conditions.

IN FLIGHT:
1. Monitor for MFD OVERHEAT caution message.

(c) GIA FAN FAIL caution

ON GROUND:
1. Do not takeoff in night or in instrument meteorological conditions.

IN FLIGHT:
1. Minimize all COM transmissions to reduce temperature.
2. Monitor for GIA 1 and GIA 2 OVERHEAT caution messages.

PFD, MFD, AND GIA OVERHEAT

(a) PFD OVERHEAT caution

NOTE

The PFD is approaching its operating temperature limit. Display brightness is automatically reduced to 50% of maximum.

1. Cross check PFD attitude, heading, altimeter, and airspeed with standby instruments.

2. If PFD primary flight instruments do not agree with standby flight instruments, or the PFD fails or is unusable, select Display Reversionary Mode using the red DISPLAY BACKUP button on the audio panel. Pull the PFD circuit breaker.

   If the PFD fails or the PFD circuit breaker is pulled, the autopilot will not operate.

(b) MFD OVERHEAT caution

NOTE

The MFD is approaching its operating temperature limit. Display brightness is automatically reduced to 50% of maximum.

1. Select Display Reversionary Mode using the red DISPLAY BACKUP button on the audio panel.

2. Cross check MFD engine instruments and primary flight instruments with the PFD. If the MFD does not agree with the PFD, or the MFD fails or is unusable, pull the MFD circuit breaker.

   If the MFD fails or the MFD circuit breaker is pulled, the autopilot mode controls on the MFD will not operate. Disengage the autopilot using the AP DISC button on the control stick.

(c) PFD OVERHEAT caution

AND

MFD OVERHEAT caution

NOTE

The PFD and MFD are both approaching operating temperature limits. The brightness of both displays is automatically reduced to 50% of maximum.

1. Refer to standby attitude, heading, altimeter, and airspeed instruments to maintain aircraft control.

2. If either the PFD or MFD fails or is unusable, pull the circuit breaker of the affected device and select Display Reversionary Mode using the red DISPLAY BACKUP button on the audio panel.

3. Land as soon as practical at a suitable airport.

   If the PFD fails or the PFD circuit breaker is pulled, the autopilot will not operate.

   If the MFD fails or the MFD circuit breaker is pulled, the autopilot mode controls on the MFD will not operate. Disengage the autopilot using the AP DISC button on the control stick.

(d) GIA1 OVERHEAT caution

OR

GIA2 OVERHEAT caution

NOTE

Either GIA 1 or GIA 2 is approaching its operating temperature limit.

1. Minimize all COM transmissions to reduce temperature.

(e) GIA1 OVERHEAT caution

AND

GIA2 OVERHEAT caution

NOTE

Both GIA 1 and GIA 2 are approaching their operating temperature limits. COM 1, COM 2, NAV 1, NAV 2, GPS 1, and GPS 2 may fail.

1. Minimize all COM transmissions to reduce temperature.

2. Land as soon as practical at a suitable airport.

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
GARMIN G1000 INTEGRATED AVIONICS SYSTEM
WITH GARMIN GFC 700 AUTOPILOT

DIAMOND MODEL DA 40
DIAMOND MODEL DA 40 F

SECTION 5
PERFORMANCE

No change. Refer to the Aircraft Flight Manual.

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
GARMIN G1000 INTEGRATED AVIONICS SYSTEM
WITH GARMIN GFC 700 AUTOPILOT

DIAMOND MODEL DA 40
DIAMOND MODEL DA 40 F

SECTION 6
WEIGHT AND BALANCE

Refer to the Aircraft Flight Manual and see current weight and balance data.

SECTION 7
SYSTEM DESCRIPTIONS

G1000 SYSTEM

The Garmin G1000 Integrated Avionics System consists of a Primary Flight Display (PFD), a Multi-Function Display (MFD), an Audio Panel, and Attitude and Heading Reference System (AHRS), an Air Data Computer (ADC), and the sensors and computers to process flight and engine information for display to the pilot. The system contains dual GPS receivers, dual VOR/ILS receivers, dual VHF communications transceivers, a transponder, an Automatic Direction Finder (ADF) receiver, Distance Measuring Equipment (DME), and an integrated annunciation system to alert the pilot of certain abnormal conditions.

The GPS receivers will either be non–WAAS capable (if GIA 63 units are installed) or WAAS capable (if GIA 63W units are installed).

The Primary Flight Display (PFD) typically displays airspeed, attitude, altitude, and heading information in a traditional format. Slip information is shown as a trapezoid under the bank pointer. One width of the trapezoid is equal to a one ball width slip. Rate of turn information is shown on the scale above the compass rose; full scale deflection is equal to a standard rate turn. The following controls are available on the PFD (clockwise from top right):

- Communications frequency volume and squelch knob
- Communications frequency set knobs
- Communications frequency transfer button
- Altimeter setting knob (baro set)
- Course knob
- Map range knob and cursor control
- FMS control buttons and knob
- PFD softkey buttons, including master warning/caution acknowledgement
- Altitude reference set knob
- Heading bug control
- Navigation frequency transfer button
- Navigation frequency set knobs
- Navigation frequency volume and Identifier knob

The PFD displays the crew alerting (annunciator) system. When a warning or caution message is received, a warning or caution annunciator will flash on the PFD, accompanied by an aural tone. A warning is accompanied by a repeating tone, and a caution is accompanied by a single tone. Acknowledging the alert will cancel the flashing and provide a text description of the message. Refer to the Emergency or Abnormal Procedures Sections of the AFM or this Supplement for the appropriate procedure to follow for each message.

Advisory messages related to G1000 system status are shown in white and are accompanied by a white flashing ADVISORY alert. Refer to the G1000 Pilot's Guide and Cockpit Reference Guide for descriptions of the messages and recommended actions (if applicable).

Trend vectors are shown on the airspeed and altimeter displays as a magenta line predicting 6 seconds at the current rate. The turn rate indicator also functions as a trend indicator on the compass scale.

The PFD can be displayed in a composite format for emergency use by pressing the red DISPLAY BACKUP button at the bottom of the audio panel. In the composite mode, the full crew alerting function remains.

The Multi-Function Display (MFD) typically displays engine data, maps, terrain, traffic and topography displays, and flight planning and progress information. The display unit is substantially identical to the PFD and contains the same controls as previously listed. Additionally, the GFC 700 autopilot mode controls are located on the MFD. These controls are described later in this section.

The audio panel contains traditional transmitter and receiver selectors, as well as an integral intercom and marker beacon system. The marker beacon lights appear on the PFD. In addition, a clearance recorder records the last 2 ½ minutes of received audio. Lights above the selections indicate what selections are active. Pressing the red DISPLAY BACKUP button on the audio panel causes both the PFD and MFD to display a composite mode.

The Attitude and Heading Reference System (AHRS) uses GPS, rate sensors, air data, and magnetic variation to determine pitch and roll attitude, sideslip and heading. Operation is possible in a degraded mode if the system loses any of these inputs. Status messages alert the crew of the loss of any of these inputs. The AHRS will align while the aircraft is in motion, but will align more quickly if the wings are kept level during the alignment process.

The Air Data Computer (ADC) provides airspeed, altitude, vertical speed, and air temperature to the display system. In addition to the primary displays, this information is used by the FMS and TIS systems.

Engine instruments are displayed on the MFD. Discrete engine sensor information is processed by the Garmin Engine Airframe (GEA) sub-system. When an engine sensor indicates a value outside the normal operating range, the legend will turn yellow for caution range, and turn red and flash for warning range.

GFC 700

The GFC 700 Automatic Flight Control System (AFCS) is a 2 axis autopilot and flight director system which provides the pilot with the following features:

- Altitude Preselect and Altitude Hold (ALT)
- Flight Level Change with Airspeed Hold (FLC)
- Vertical Speed Hold (VS)
- Navigation tracking for VOR (NAV) and GPS (GPS)
- Heading Hold (HDG)
- Approach mode coupling to VOR (VAPP) or localizer (LOC) and glideslope (GS)
- Back Course (BC) tracking
- Go Around (GA) pitch/roll guidance.
- Glidepath coupling (GP) (GIA 63W equipped aircraft only)
- Vertical Navigation (VPTH) (optional feature)

The system consists of autopilot controls on the Multi-Function Display (MFD), servos with autopilot processing logic, Flight Director processing logic in the GIAs, a left control stick-mounted elevator trim switch, a control stick-mounted trim interrupt and autopilot disconnect switch on both sides, a left control stick-mounted CWS (Control Wheel Steering) switch, a throttle-mounted GA (Go-Around) switch, and PFD/MFD-mounted altitude preselect, heading, and course knobs.

Flight Director commands and autopilot modes are displayed on the PFD. Full AFCS functionality is only available with the both displays operating, and will disconnect under certain reversionary conditions.

Upon initial system power-up, the system undergoes a preflight test. At the end of the test, the autopilot disconnect tone sounds and the PFT and AFCS annunciations are removed. Successful completion of the preflight test is required for the autopilot and manual electric trim to engage.

Annunciation of the flight director and autopilot modes is shown in the lower status field of the PFD. In general, green indicates active modes and white indicates armed modes. When a mode is directly selected by the pilot, no flashing of the mode will occur. When automatic mode changes occur, they will be annunciated with a flashing annunciation of the new mode for ten seconds in green. If a mode becomes unavailable for whatever reason, the mode will flash for ten seconds in yellow and be replaced by the new mode in green.

The GFC 700 autopilot contains an electric pitch trim system which is used by the autopilot for automatic pitch trim during autopilot operation and by the pilot for manual electric pitch trim when the autopilot is not engaged. The manual electric pitch trim system is operated by a split switch on the left control stick.

The GFC 700 autopilot and manual electric trim (MET) will not operate until the system has satisfactorily completed a preflight test. The preflight test begins automatically with initial power application to the autopilot (AVIONIC MASTER Switch is set to the ON position).

The following conditions will cause the autopilot to automatically disconnect:

- Electrical power failure
- Internal autopilot system failure
- AHRS malfunction
- Loss of Air Data Computer information

The GFC 700 may be manually disconnected by any of the following means:

- Depressing the red AP DISC button on either control stick
- Moving the left (outboard) side of the manual electric trim switch on the left control stick
- Pushing the AP button on the autopilot mode controller when the autopilot is engaged
- Depressing the GA button on the left side of the throttle
- Pulling the AFCS circuit breaker
- Turning off the AVIONIC MASTER switch
- Turning off the airplane Master (ALT/BAT) switch

In addition, the CWS (control wheel steering) switch on the pilot's control stick will disconnect the autopilot servos from the airplane flight controls as long as the CWS switch is depressed.

Power to the GFC 700 autopilot and electric trim system is supplied through the AVIONIC MASTER switch and the AFCS circuit breaker. The AVIONIC MASTER switch can be used as an additional means to disable the autopilot and electric trim system.

The red AP DISC switch on the either control stick will interrupt power to the manual electric trim for as long as the switch is depressed.

Loss of instruments or components of the G1000 system will affect the GFC 700 AFCS as follows:

- Loss of the AHRS will cause the autopilot to disconnect. The autopilot and flight director will be inoperative. Manual electric trim will be available.
- Loss of the heading function of the AHRS will result in loss of the HDG mode. If in HDG mode at the time heading is lost, the autopilot will revert to basic roll mode (ROL).
- Loss of the MFD will not cause the autopilot to disconnect, and will remain engaged with limited functionality, but the autopilot cannot be re-engaged once disconnected.
- Loss of the PFD will cause the autopilot to disconnect. The autopilot and flight director will be inoperative. Manual electric trim will be available.
- Loss of air data computer information will cause the autopilot to disconnect. The autopilot will be inoperative. The flight director will be available except for air data modes (ALT, VS, FLC). Manual electric trim is available.
- Loss of GIA #1 will cause the autopilot to disconnect. The autopilot, flight director and manual electric trim will be inoperative. Loss of GIA #2 will also prevent autopilot and manual electric trim operation, but flight director will be available.
- Loss of the standby airspeed indicator, standby attitude indicator, standby altimeter, or standby compass will have no effect on the autopilot.
- Loss of both GPS systems will cause the autopilot and flight director to operate in NAV modes (LOC, BC, VOR, VAPP) with reduced accuracy. Course intercept and station crossing performance may be improved by executing intercepts and station crossings in HDG mode, then reselecting NAV mode.

WARNING

FOLLOWING AN AUTOPILOT OR ELECTRIC TRIM MALFUNCTION, DO NOT RE-ENGAGE THE AUTOPILOT OR MANUAL ELECTRIC TRIM, OR RESET THE AFCS CIRCUIT BREAKER, UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN DETERMINED AND CORRECTED.

Normal autopilot disconnects are annunciated with a yellow flashing AP on the PFD accompanied by a two second autopilot disconnect tone. Normal disconnects are those initiated by the pilot with the AP DISC switch, the MET switch, the AP button on the MFD mode controller, or the GA button.

Abnormal disconnects will be accompanied by a red flashing AP on the PFD accompanied by a continuous autopilot disconnect tone. The disconnect tone

and flashing alert may be cancelled by pressing the AP DISC switch or the left side of the MET switch.

Refer to the Garmin G1000 Pilot's Guide for the Diamond DA 40, for a complete description of the GFC 700 system and operating procedures.

7.10 FUEL SYSTEM

Fuel Quantity Indication

Each fuel tank has a capacity probe that ascertains fuel quantity in that tank. Standard Tank configurations have two fuel probes, one in each wing. Long Range Tank configurations have four fuel probes, two in each wing, an outboard tank and an inboard tank. When the fuel quantity indicator reads zero, only unusable fuel remains in the tank. Usable capacity of each tank for the Standard Tank configuration is 20 US gal (76 liters). Usable capacity of an outboard and inboard tank for the Long Range Tank configuration is 24 US gal (91 liters).

Fuel quantity:

Fuel quantity indicating for the Standard Tank configuration functions as described in the DA 40 AFM. Also, refer to the 'G1000 Pilot's Guide for the Diamond DA 40' for additional information about the functionality of the G1000's fuel quantity gauge.

For the Long Range Tank configuration, dual pointers on a linear scale, a top pointer for the left fuel quantity and a bottom pointer for the right fuel quantity indicate fuel quantity. The fuel quantity gauge is marked in five gallon increments starting at zero to 25 US gal. The break in the green band between 16 and 19 US gal shows the un-gauged portion of the fuel tanks usable fuel.

When a fuel tank is completely full, the quantity pointer will indicate 24 US gallons. As fuel is consumed from the tank, the pointer will move to the left. Once there is no more measurable fuel in the outboard tank, the pointer migrates over a 30 second period to the 16 US gal position. The pointer will remain at 16 US gallons while the un-gauged fuel quantity is consumed. Once the quantity of fuel remaining in the inboard tank is less than 16 gallons, the pointer will begin moving left towards zero. When either pointer enters the amber portion of the scale, the pointer and the gauge title, 'FUEL QTY GAL', will turn amber. When either pointer enters the red portion of the gauge, the pointer will turn red, and the gauge title, 'FUEL QTY GAL', will turn red and flash continuously in inverse video.

Part Information

GPN:	190-00492-10
Description:	AFMS,G1000 Integ. Avionics Sys w/GFC700 AFCS, Diamond DA40/F
Part Type:	Manuals / Printed Literature
Lifecycle Phase:	Experimental
Rev:	8 ECO#099458

Item Attribution

Document Review Required:	ARR
Item Notes:	
Preferred Rating:	
ESD Sensitive:	
Moisture Sensitive:	
Limited Shelf Life:	
Magnetic Sensitive:	